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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO.
10/078,601	02/19/2002	Xiaoming Ren	107044-0013	5541

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CESARI AND MCKENNA, LLP
88 BLACK FALCON AVENUE
BOSTON, MA 02210

EXAMINER	
ALEJANDRO, RAYMOND	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 06/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/078,601	REN ET AL.
	Examiner	Art Unit
	Raymond Alejandro	1745

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *37-84* is/are pending in the application.

4a) Of the above claim(s) *47-54,59-61,64,67 and 74-84* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *37-46, 55-58, 62-63, 65-66 and 68-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This action is replying the amendment filed 04/14/04. The applicants have overcome the objections and the 35 USC 112 rejection. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the 35 USC 102 rejection is herein maintained for the reasons of record. Thus, the present claims are finally rejected.

Election/Restrictions

1. This application contains claims 47-54, 59-61, 64, 67 and 74-84 drawn to an invention nonelected without traverse in Paper No. 12/18/03. A complete reply to the final rejection must include cancelation of nonelected claims or other appropriate action.

Drawings

2. The proposed drawing corrections were received on 04/14/04. These proposed drawing corrections are acceptable.

3. Replacement drawing sheets are still required in this application. The official corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 42 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 42 is indefinite as it depends from cancelled claim 27. *For purpose of prosecution, claim 42 has been construed as depending from independent claim 37.*

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 37-46, 55-58, 62, 63, 65, 66 and 68-73 are rejected under 35 U.S.C. 102(e) as being anticipated by Corey et al 2002/0172851.

The present claims are drawn to a direct oxidation fuel cell wherein the claimed inventive concept comprises the specific anode chamber configuration and gas effluent release port.

With respect to claim 37, 44-46, 55-56, 62-63:

Corey et al disclose a direct oxidation fuel cell system 20 (DMFC) including a membrane electrolyte assembly 22 having a proton-conducting, electronically non-conductive membrane electrolyte 26 disposed between an anode chamber 22 and a cathode chamber 24 (SECTION 0039). Each surface of the membrane electrolyte 26 is coated with electrocatalysts which serve as anode reactive sites 23 on the anode chamber side of the membrane and cathode reactive sites

25 on the cathode chamber side of the membrane, thereby, facilitating the electrochemical reactions of the DMFC (SECTION 0039). *It is noted that the membrane electrolyte 26 may act as the specific gas-permeable, liquid impermeable layer coupled to the anode diffusion layer.*

Diffusion layers 27 and 28 may be included and positioned on either side of the membrane and provide a uniform effective supply of methanol solution to the anode reactive sites (SECTION 0041). It is disclosed that fuel cells generate electricity through electrochemical reactions (SECTION 0004) and they have a circuit connecting the anode chamber and the cathode chamber through an external electrical load (SECTION 0009 & 0043). Corey et al also disclose that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014). *Thus, Corey et al clearly envisage having the gaseous effluent generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere.*

Corey et al further disclose, *in particular*: that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014); as well as an effluent gas produced in an anode chamber of a fuel cell is collector and then exhausted through a cathode chamber of the fuel cell (SECTION 0020); having the carbon dioxide produced from the oxidation of fuels not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion allowing effluent gas produced in said anode chamber to flow into the cathode chamber (SECTION 0026). *Thus, Corey et al clearly envisage having the gaseous effluent*

generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere.

Figure 5 below depicts a passive control system using gas produced in the anode chamber for removing water from the reactive sites in the cathode chamber (SECTION 0085).

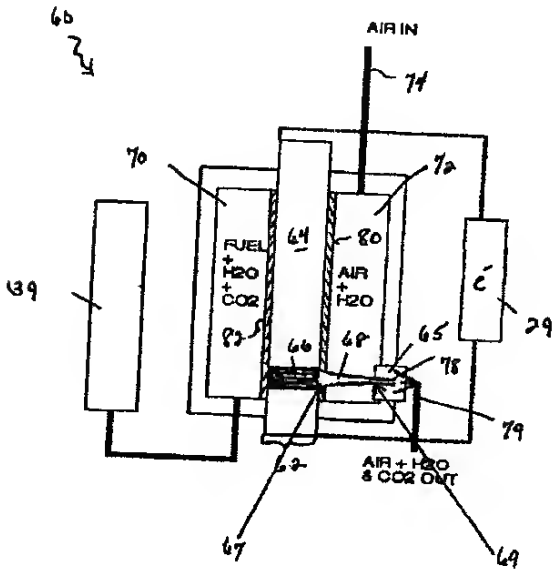

FIG. 5

As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020), this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it has a liquid closed volume anode chamber, and no anode liquid recirculation. These features act as a gaseous anodic product removal component. This structure also encompasses the absence of any water external pumping and/or active water removal element.

As previously mentioned, the fuel cell system of **Figure 5** above represents a *passive* fuel cell system (SECTION 0085). *Thus, it operates without external pumping of cathodically-generated water and without active water removal elements.*

With respect to claims 38-39, 57-58 and 68-71:

Corey et al teach the use of methanol (SECTIONS 0007, 0009, 0011) as well as the addition of another liquid such as water (SECTION 0009, 0041, 0043 & FIGURE 5). It is also disclosed that in a DMFC system, an aqueous methanol solution, preferably a solution greater than 0 to about 100 % methanol by volume can be used (SECTION 0043).

With respect to claim 38 and 40:

As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020 and 0026, this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it does have a liquid closed volume anode chamber, and no anode liquid recirculation.

With respect to claims 41 and 43:

Corey et al disclose that the carbon dioxide produced from the oxidation of fuels is not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion allowing effluent gas produced in said anode chamber to flow into the cathode chamber (SECTION 0026). *Thus, this implies that the water produced at the cathode is not collected or*

redirected to the anode, in fact, the anode effluent is being employed to remove such water out of the fuel cell system. Thus, a portion of the anode chamber is gas permeable.

With respect to claims 42-43:

Corey et al further disclose that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014);

With respect to claim 65:

Reference numeral 39 is a fuel supply cartridge and represents the external fuel source (SECTION 0080).

With respect to claims 66 and 72-73:

It is disclosed the establishment of low pressure regions adjacent the outlet in the anode chamber (SECTION 0026, 0088). *Thus, a pressure differential does exist between the fuel in the fuel source and the anode chamber. Accordingly, it is noted that this pressure differential effectively creates suction conditions in the anode chamber.*

Thus, the claims are anticipated.

Response to Arguments

6. Applicant's arguments filed 04/14/04 have been fully considered but they are not persuasive. Throughout the entire rebutting section of the aforementioned amendment, the applicants have mainly contended that the prior art fails to teach having "*CO_2 generated in the anodic reaction being vented substantially directly to the ambient environment*" or "*venting CO_2 substantially directly to the ambient environment, not through the cathode chamber, and it does not include fluidic communication for delivering anodically-generated CO_2 from the anode*

chamber to the cathode chamber" or "*anodically generated effluent is released directly to the ambient environment*". First of all, the examiner likes to point out that the present claims are not commensurate in scope with foregoing argumentative language. That is to say, the present claims are completely silent as to either: i) venting CO_2 generated in the anodic reaction out of the anode chamber, or ii) positively reciting that the anodically effluent is released to the environment. Nowhere in the claims the examiner can find that CO_2 is vented out of the anode chamber or released out of anode chamber and its implication of assisting in efficient fuel management or delivery, avoiding the need for pumping/valving the CO_2 or the need to recirculate unreacted fuel back into the fuel cell and the like. Secondly, all of the above said, it is noted that the fact that the claim language recites that "the gaseous effluent release port…is substantially direct fluid communication with the ambient environment" does not immediately and constructively refer that anodically-generated CO_2 is always vented or released therefrom. Moreover, although the effluent release port is in direct fluid communication with the ambient environment, it does not necessarily imply that that gas venting or releasing must take places. It just implies that the structure may allow fluid communication therebetween under certain conditions. To be precise, it has not been set forth whether that fluid communication takes place during regular operation of the fuel cell, during emergency shut down, during fuel cell start-up or simply at certain time intervals related to predetermined working conditions and the like.

Now, with respect to the specific assertion that the prior art does not disclose venting CO_2 out of the anode chamber, the examiner wishes to contend that, (*and as admitted by the applicants, see page 23 of the amendment, paragraph bridging pages 23-24*) the prior art clearly discloses that the effluents could be removed by venting the carbon dioxide out of the anode

chamber (Refer to Corey et al, SECTION 0014). Thus, Corey et al clearly envisage and directly teach having the gaseous effluent generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere. Thus, this assertion is ill placed as the prior art clearly teaches venting the generated CO_2 gas. It is further noted that applicants have also admitted that in some instances in the fuel cell system of Corey under limited circumstances, it may be desirable to vent some CO_2 out of the anode chamber to avoid a build-up, or in other cases, excess amounts of CO_2 beyond that needed to maintain desired operating conditions, may be vented to the ambient (*see page 24 of amendment, 1st and 2nd paragraphs)*. Therefore, it is not understood why applicants have taken the position of contending that the prior art fails to disclose the foregoing limitations when in fact and without a reasonably doubt the prior art suggest to do so.

As to the allegation that "*Applicant's invention is a simplified system that promotes fuel efficiency by venting CO2 substantially directly to the ambient environment, and not through the cathode chamber, and it does not include fluidic communication for delivering anodically-generated CO2 from the anode chamber to the cathode chamber*" (see page 23 of amendment, 2nd full paragraph), again, it is noted that the claim language does not set forth or, at least suggest, the necessary functional and structural interrelationship to satisfy the requirement argued by the applicants. Thus, the above-mentioned features upon which applicant relies are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). In addition, it is further pointed out the present claim language also reads on having the generated CO_2 vented out of the anode

chamber through the cathode chamber as no CO_2 gas fluid restriction has been indicated in the present claims.

In response to applicant's argument that "*Corey et al teaches water removal from the cathode chamber using CO_2*" and "*that an active water removal element is included in Corey et al*", the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

As far as the requirement of having "a gas permeable, liquid impermeable layer coupled to the anode diffusion layer", the examiner also likes to state that the membrane electrolyte 26 per se may act as the specific gas-permeable, liquid impermeable layer coupled to the anode diffusion layer as Corey et al (*and as admitted by the applicants*) address the issue of allowing the passage of CO_2 from the anode chamber to the cathode chamber which are physically separated from one another by the membrane electrolyte 26. Consequently, the membrane electrolyte 26 exhibits gas permeability characteristics. Absent any further specific structural relationship between the anode layer and the gas-permeable liquid-impermeable layer (*e.g. specific placement, positioning, etc*), the examiner respectfully submits that the membrane electrolyte 26 does meet the requisite of the claimed limitation.

Regarding applicants' argument with respect to claim 62, it is asserted that applicants themselves have admitted that Corey et al does not suggest an exit port for liquid, that is, applicants have argued that "*although Corey suggests an anode supply for liquid into the anode chamber, it does not suggest an exit port for liquid*" (refer the page 26 of the amendment, 2nd last

full sentence). Hence, applicants' arguments reflect that Corey et al has no exit port for liquid as instantly claimed.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745